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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 04/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/667,777	KOMINO ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 13, 14, and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 13, 30 recite the limitations "core metal is" and "electrostatic", respectively. There is insufficient antecedent basis for "core metal" and "electrostatic", respectively in the claims. It is assumed Applicant refers to "core metal plate". Claim 30 ends "for joining to the electrostatic". The Examiner assumes Applicant intended to claim "for joining to the electrostatic chuck." Correction is required.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Sagusa et al (JP09-165681)[1]. Sagusa teaches an electrode (Figure 1B, 4) including:

i. A base metal ("aluminum rolled stock 13" [0011]) made of a cast metal – Applicant's specification (page 12, line 37 – page 13, line 2) teaches aluminum as the "cast metal".

ii. A heater ("sheath heater 11"; [0011] computer translation) arranged in a plane

iii. An upper and lower ceramic-metal composite (12, "cordierite (2MgO, $2Al_2O_3$, and $5SiO_2$) of ceramics" [0012]) arranged above and below the heater (Figure 1B) comprises a preformed (required for the sealing of the composites within the aluminum rolled stock) porous ("pinhole" [0006], [0017]) ceramic (12, "cordierite (2MgO, $2Al_2O_3$, and $5SiO_2$) of ceramics" [0012]) infiltrated (Al within $2Al_2O_3$) with the base metal ("aluminum rolled stock 13" [0011])

iv. Wherein the heater and the upper and lower ceramic-metal composite are cast in the base metal ("aluminum rolled stock 13" [0011])

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 6, 8, 11, 16, 19, 27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillin et al (USPat. 5,835,334). McMillin teaches a susceptor (Figure 1; column 4, lines 9-18) in a processing vessel (not shown, column 4, lines 17-18) including:

i. A heater (17; Figure 3; column 7, lines 21-30 – see common 6a in Figures 1 and 3) arranged on a plane including piping ("cable")

ii. A upper (1c as part of "1"; column 4, lines 19-39) and lower (3; column 4, lines 15-18; also "anodized aluminum" of 2 - column 4, lines 10-15) ceramic-metal composite (Al_2O_3) arranged above and below the heater

iii. An electrostatic chuck ("base" 1 of 100; Figure 1) for holding an object (4; Figure 1) to be treated

iv. The electrostatic chuck (1 of 100; Figure 1) having a coefficient of linear thermal expansion substantially the same (column 5, lines 41-47 – at temperatures below 200°C) as that of the upper ceramic-metal composite and being joined to an upper ceramic-metal composite

v. The upper ceramic metal composite and the electrostatic chuck are formed by anodization, not brazed together as claimed by claim 8 - Because the examiner has provided a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Refer to MPEP 2113.

vi. The susceptor further configured so that a high frequency power electrode (2; column 5, lines 25-32) is provided as claimed by claim 11

vii. A plasma processing (title) apparatus comprising:

a. A processing vessel (not shown, column 4, lines 17-18)

b. A susceptor (Figure 1; column 4, lines 9-18) including:

i. A heater (17; Figure 3; column 7, lines 21-30 – see common 6a in Figures 1 and 3) arranged in a plane

ii. An upper (1c as part of "1"; column 4, lines 19-39) ceramic-metal composite arranged above the heater

iii. An lower ceramic-metal (3; column 4, lines 15-18) composite (Al_2O_3) arranged below the heater

iv. An electrostatic chuck (1 of 100; Figure 1) for holding an object to be treated, the electrostatic chuck (1 of 100; Figure 1) having a coefficient of linear thermal expansion substantially the same (column 5, lines 41-47 – at temperatures below 200°C) and being joined to an upper surface of the upper ceramic-metal composite

v. A high frequency power source (column 5, lines 25-33) that applies a high frequency voltage to the susceptor as claimed by claim 16

viii. The upper ceramic metal composite and the electrostatic chuck are formed by anodization, not brazed together as claimed by claim 19 - Because the examiner has provided a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Refer to MPEP 2113.

ix. a ceramic base ("anodized aluminum" column 4, lines 10-13) of a ceramic material (Al_2O_3) and a metallic electrode (1; Figure 1) embedded (1c; "anodized aluminum" column 4, lines 10-13) in the ceramic base and adapted to generate an electrostatic force ("ESC"; column 3, lines 37-50) that attracts the object (4) to be treated, as claimed by claim 27, 29

McMillin does not teach that his electrostatic chuck is made of a ceramic material. However, McMillin does teach that his lower electrode (2) is made of a ceramic material ("anodized aluminum" column 4, lines 10-13).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to use a ceramic material as the material of choice for McMillin's electrostatic chuck.

Motivation to use a ceramic material as the material of choice for McMillin's electrostatic chuck is to prevent cracking between McMillin's electrostatic chuck (1) and McMillin's anodized aluminum cap (column 5, lines 40-47).

8. Claims 2, 5, 7, 12, 13, 17, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillin et al (USPat. 5,835,334) in view of Sagusa et al (JP09-165681) and J.F.Shackelford. McMillin teaches a high frequency power electrode as discussed above and also including:

i. A heater (17; Figure 3) arranged on a plane

ii. A core metal plate (2; Figure 1) arranged parallel to the plane and adjacent the heater (see common 6a in Figures 1 and 3)

iii. The heater and the core metal plate are cast between a ceramic (1c, 3 - Al_2O_3)

iv. The material forming the core metal plate (2; Figure 1 – "anodized aluminum"; column 4, lines 10-15) has a rigidity higher than that of the material forming the base metal of Sagusa ("aluminum rolled stock 13" [0011])[2] – Shackelford teaches a "rigid modulus" of the "Modulus of Elasticity" Aluminum Alloys = 70GPa, Al_2O_3 = 370GPa according to http://www.matweb.com/search/SearchProperty.asp.

McMillin et al differs from the present invention in that the heater and the core metal plate are encased in a ceramic, not a metal.

[2]Introduction to Materials Science for Engineers, J.F. Shackelford; 3rd Ed. 1992, Macmillan Publishing Co. pp.460-461 and http://www.matweb.com/search/SearchProperty.asp

The teachings of Sagusa are discussed above. Sagusa further teaches upper and lower ceramic-metal composite (12, "cordierite (2MgO, $2Al_2O_3$, and $5SiO_2$) of ceramics" [0012]) and the heater (11) are embedded in a ceramic while the upper surface (Figure 3) of the upper ceramic-metal composite (12, "cordierite (2MgO, $2Al_2O_3$, and $5SiO_2$) of ceramics" [0012]) is exposed (Figure 3) - claim 28, 30.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to replace Sagusa's ceramic-metal composite (12, "cordierite (2MgO, $2Al_2O_3$, and $5SiO_2$) of ceramics" [0012]) and heater (11) with McMillin's electrode (1; Figure 1), heater (6a), and core metal plate (2) embedded, and joined ([0015] in Sagusa), in Sagusa's base metal ("aluminum rolled stock 13" [0011]) such that McMillin's core metal plate is entirely in metal-to-metal contact with Sagusa's base metal (resulting from Sagusa's isostatic pressing operation – 31, Figure 5; [0013]-[0015]). The replacement resulting in McMillin's core metal plate (2; Figure 1) entirely surrounded by, and contacting with, Sagusa's base metal (13).

Motivation for McMillin to encase his electrode (1; Figure 1), heater (6a), and core metal plate (2) in Sagusa's base metal is taught by Sagusa as preventing "gas discharge within vacuum devices" ([0017]).

9. Claims 3, 4, 14, 15, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillin et al (USPat. 5,835,334), Sagusa et al (JP09-165681), and J.F.Shackelford in view of Wang et al (USPat. 5,755,886). McMillin, Sagusa, and J.F.Shackelford are discussed above. McMillin and Sagusa do not teach a core metal plate that has a plurality of through-holes filled with the base metal, so that the base metal above and below the plate is bound together via the

base metal in the through-holes, and such that the base metal is configured to adopt a shower head portion that supplies a gas. Wang teaches a gas manifold system (122, Figure 12).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to add borings for passing process gas, and to add through-holes for binding the base metal, to the apparatus of McMillin and Sagusa as taught by Wang.

Motivation for McMillin and Sagusa to add borings for passing process gas, and to add through-holes for binding the base metal, to the apparatus of McMillin and Sagusa as taught by Wang is to provide for an even distribution of process gas across the surface of the wafer (column 4, lines 59-67) and to affix the base metal as taught by McMillin (column 4, lines 52-55).

10. Claims 9, 10, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillin et al (USPat. 5,835,334). McMillin teaches alternative methods including "deposition, spray, bonding, or other similar process" (column 3, lines 23-36), but not including forge-welding and adhering, for bringing together the upper ceramic metal composite and the electrostatic chuck.

It would have been obvious for one of ordinary skill in the art at the time the invention was made for McMillin to use alternative methods including forge-welding and adhering for bringing together the upper ceramic metal composite and the electrostatic chuck.

Motivation for McMillin to use alternative methods including forge-welding and adhering for bringing together the upper ceramic metal composite and the electrostatic chuck is drawn to equivalent and well-known techniques for bringing together apparatus parts as taught by McMillin (column 3, lines 23-36).

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over McMillin et al (USPat. 5,835,334) in view of Fukasawa et al (USPat. 5,310,453). McMillin is discussed above. McMillin does not teach a heat transfer gas provided at the surface of the chuck. Fukasawa teaches a wafer support table (20, Figure 1) including a chuck electrode (10) with a heat transfer gas applied at its surface (column 6, lines 18-30).

It would have been obvious for one of ordinary skill in the art at the time the invention was made for McMillin provide a heat transfer gas at the surface of the chuck to enable temperature control of the wafer as taught by Fukasawa (column 6, lines 20-23).

Motivation for McMillin provide a heat transfer gas at the surface of the chuck to enable temperature control of the wafer as taught by Fukasawa for compensating heat between the chuck and the wafer W.

12. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watmough (USPat. 4,404,262) in view of Sagusa et al (JP09-165681).

Watmough teaches a method for manufacturing a metal-ceramic composite including:

i. Placing porous ceramics (12, column 3, lines 10-25) in a mold (22, Figures 1-8)

ii. Pouring a molten base metal (26) into the mold to cast porous ceramic with the base metal, thereby infiltrating the porous ceramic with the base metal in order to form a ceramic-metal composite (column 3, line 66 – column 4, line 14)

Watmough does not teach placing a heater inside the ceramic prior to the composite forming steps.

The teachings of Sagusa are discussed above. Specifically, Sagusa teaches a heater and the upper and lower ceramic-metal composite are cast in a base metal ("aluminum rolled stock 13" [0011]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to cast the apparatus of Sagusa following the method of Watmough to form a ceramic-metal composite.

Motivation for Sagusa to follow the teachings of Watmough by forming a ceramic-metal composite is discussed by Watmough as providing added strength (column 1, lines 42-55).

13. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sagusa et al (JP09-165681)[3] in view of McMillin et al (USPat. 5,835,334). Sagusa and McMillin are discussed above. Sagusa does not teach a high-frequency powered electrode.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to add McMillin's high-frequency powered electrode (2) as part of the Sagusa apparatus.

Motivation to add McMillin's high-frequency powered electrode (2) as part of the Sagusa apparatus is to conduct plasma processing as taught by McMillin (column 4, lines 15-18).

14. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sagusa et al (JP09-165681) in view of Wang et al (USPat. 5,755,886). Sagusa is discussed above. Sagusa does not teach that the base metal is configured to adopt a shower head portion that supplies a gas. Wang teaches a gas manifold system (122, Figure 12).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to add borings for passing process gas and purge gas services to the apparatus of Sagusa as taught by Wang.

Motivation for Sagusa to add borings for passing process gas and purge gas services as taught by Wang is to provide for an even distribution of process gas across the surface of the wafer (column 4, lines 59-67).

Response to Arguments

15. Applicant's arguments filed December 31, 2003 have been fully considered but they are not persuasive.

16. With respect to Applicant's position:

"

Sagusa et al. fails to anticipate independent claim 1 because it does not disclose, among other things, that a heater and upper and lower ceramic-metal composites are cast in the base metal, and that each of the upper and lower ceramic-metal composites comprises a preformed porous ceramic infiltrated with the base metal," as recited in independent claim 1.

" Applicant is directed to the body of the above claim rejection for Sagusa's teaching to the claimed subject matter.

Applicant's interpretation of the Examiner's citation of McMillin (Column 5, lines 41-47) is erroneous. Applicant states "the cap temperature must be maintained below 200°C, i.e. in the range where the material expansion does not occur.." (page 11). McMillin makes no such statement in the Examiner's citations thereof that the cap temperature has a range where expansion does not occur as suggested by Applicant. McMillin only states that processing

conditions (i.e. temperature) are maintained in a favorable range so that differences in thermal expansion does not lead to prevent cracking. Further, it is well established that apparatus claims must be structurally distinguished from the prior art (In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does ."(emphasis in original) Hewlett - Packard Co . v. Bausch & Lomb Inc ., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990), MPEP – 2114). Further, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Exparte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

17. It is further noted that because McMillin teaches maintaining favorable processing conditions "to prevent cracking", resulting from differences in thermal expansion, McMillin then precisely teaches Applicant's contended "a ceramic electrostatic chuck . .. having a coefficient of linear thermal expansion substantially the same as that of the upper ceramic-metal composite," as recited in independent claim 6.

18. Applicant states that "In addition, McMillin et al. does not disclose "a ceramic electrostatic chuck .. .being joined to an upper surface of the upper ceramic-metal composite". This implies that the upper ceramic-metal composite has plural "upper surface". As such the Examiner maintains his interpretation that McMillin's an upper surface (1c/1 interface) of the upper ceramic-metal composite (1c as part of "1"; column 4, lines 19-39) is taught by McMillin.

19. Applicant states that the combination of Watmough (USPat. 4,404,262) in view of Sagusa et al (JP09-165681) will not generate a "reasonable expectation for success". The Examiner disagrees because Watmough teaches a method for manufacturing a metal-ceramic

composite as claimed, and further, it would have been obvious to cast the apparatus of Sagusa following the method of Watmough to form a ceramic-metal composite as taught by Watmough. Motivation for Sagusa to follow the teachings of Watmough by forming a ceramic-metal composite is discussed by Watmough as providing added strength (column 1, lines 42-55). Therefor, the Examiner believes that a "reasonable expectation for success" is present based on the combined teachings of Watmough (USPat. 4,404,262) in view of Sagusa et al (JP09-165681).

20. The remainder of Applicant's arguments are directed to amendments to the claims filed in the preceding correspondence to which this response is directed. Accordingly, said arguments are addressed in the body of the newly rejected claims as presented above.

Conclusion

21. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.

JEFFRIE R. LU
PRIMARY EXAMINER